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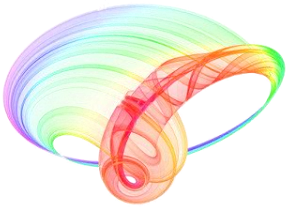

PHOTONICA2017

The Sixth International School and Conference on Photonics

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One-step synthesis of NIR-responsive $NaYF_4$:Yb,Er@Chitosane nanoparticles for biomedical application

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There is a great technological interest in synthesis of lanthanide doped upconverting nanoparticles with specific morphological characteristics and efficient luminescence response suitable for biomedical use [1]. A conventional approach for generation of such particles comprises decomposition of organometallic compoundsin an oxygen-free environment and additional ligand exchange [2,3]. The biocompatible and water soluble $NaYF_4$:Yb,Er@Chitosane particles used in this study were synthesized through facile one-pot hydrothermal synthesis and were characterized using X-ray powder diffraction (XRPD), Fourier-transform infrared (FTIR) spectroscopy, field emission scanning and transmission electron microscopy (FESEM and TEM) and photoluminesce measurement (PL). Due to the presence of the amino groups at their surface these particles exhibit excellent hydrophilic properties and low cytotoxicity against human gingival fibroblasts (HGF), which was proven by MTT assay. Furthermore, upon 980 nm laser irradiation the as-prepared particles were successfully used for *in-vitro* visualization of the primary cell cultures of head and neck squamous carcinoma cells (HNSCC). In a NaYF4:Yb,Er phase upconversion is enabled by the sequential absorption of two or more near-infrared photons by Yb^{3+} and subsequent energy transfer to the long-lived metastable electron states of Er^{3+} which produces luminescence emission at visible spectra after relaxation.

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